

REVISION OF THE GENUS *DIPCADI* MEDIK. (LILIACEAE) IN INDIA AND ADJOINING REGIONS¹

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(With ten text-figures)

The paper presents a taxonomic revision of the genus *Dipcadi* Medik. (Liliaceae) in India and adjoining regions. 9 species and two varieties are described with all synonyms and their original citations. References of Indian regional Floras are included. A key to the species and varieties is given. Distribution and phenology of the taxa are traced distinctly. Exsiccata studied are cited. *Dipcadi hydysuricum* (Edgew.) Baker and *D. unicolor* (Stocks) Baker are relegated to synonymy of *D. serotinum* (L.) Medik. and *D. erythraeum* Webb & Berth. respectively. *D. madrasicum* Fischer & Barnes is reduced to a variety of *D. montanum* (Dalz.) Baker and a new combination is proposed thereon. Two new species and one new variety are described.

The genus *Dipcadi* was postulated by Medikus in Act. Acad. Theod. Palat. 6:431. 1790, on the basis of *Hyacinthus serotinus* L. collected from Spain. Medikus (1790) distinguished this genus from *Hyacinthus* L. on the basis of tubular, erect perianth lobes and numerous flat seeds. Ker-Gawler (1816) described the genus *Uropetalum* (Sphalm. *Uropetalon*) in Bot. Reg. t. 156. 1816 on the basis of sixfid, tubular perianth, lobes subduplicate to the tube, and numerous flat seeds. Edgeworth (1846), Dalzell (1850) and Stocks (1852) subsequently added some species to this genus from Indian subcontinent.

Reichenbach (1828), Endlicher (1836), Lindley (1836) and Kunth (1843) did not recognize the genus *Dipcadi*. Baker (1871) however, revived *Dipcadi* Medik. and relegated *Uropetalum* Ker-Gawl. to synonymy of the former. In his monographic studies Baker

(l.c.) subdivided bulbous Liliaceae with racemose inflorescence into two groups, gamophyllous Hyacintheae and polyphyllous Scilleae and placed *Dipcadi* Medik. in the former group. Bentham (1883) did not lay any importance on such distinction and merged the Hyacintheae in Scilleae, thereby placing *Dipcadi* Medik. therein. Subsequent workers followed Bentham (l.c.) in keeping all the genera under a single group without subdividing the tribe. Engler & Prantl (1930), raised it to the rank of a subfamily in the name of Scilloideae. They, however, did not recognize any tribal status in it. Hutchinson (1960) on the other hand, did not recognise the subfamily.

About 55 species, distributed in Mediterranean region, Africa, Madagascar and India occur (Willis 1973).

The present paper is based on the study of specimens deposited in the Indian and few foreign herbaria. The species found in India in the broad sense are treated here.

Measurements of pollens are taken after acetolysis.

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² Botanical Survey of India, Calcutta.

Herbaria consulted

Symbols for the herbaria consulted are indicated in the parenthesis after the respective names as follows:

Central National Herbarium, B.S.I., Calcutta (CAL)
 Western Circle, B.S.I., Poona (BSI)
 Central Circle, B.S.I., Allahabad (BSA)
 Southern Circle, B.S.I., Coimbatore (MH)
 Northern Circle, B.S.I., Dehra Dun (BSD)
 Blatter herbarium, Bombay (BLAT)
 Forest Research Institute, Dehra Dun (DD)
 Royal Botanic Garden, Kew (K)
 Royal Botanic Garden, Edinburgh (E)
 British Museum (Natural History), London (BM)
 Linnean Society of London (LINN)

Dipcadi Medik. in Act. Acad. Theod. Palat. 6:431. 1790; Baker in Journ. Linn. Soc. 11: 395. 1871; Benth. & Hook. f. Gen. Pl. 3:809. 1883; Hook. f. Fl. Brit. Ind. 6:345. 1892; Cooke, Fl. Pres. Bomb. 2:769. 1907; Bamber, Pl. Punjab 441. 1916. *Hyacinthus* L. Sp. Pl. 317. 1753 & Gen. Pl. ed. 5:149-1754. *Zuccagnia* Thunb. Nov. Gen. Pl. 9. 127.1798 & in Roem. Arch. Bot. 2:2. 1799. *Scilla* Sims. Bot. Mag. 21. t. 859.1805. *Uropetalum* Ker-Gawl. Bot. Reg. 2:t.156, 1816. *Polemannia* Berg. ex Schlecht. in Linnaea 1:260. 1826. *Tricharis* Salisb. Gen. Pl. 24. 1866.

Taxonomic characters

The following attributes were examined in a search of characters useful for taxonomic and diagnostic purposes in the genus.

Habit—Plants are erect or ascending 10-75 cm tall. Height of the plant varies within the species. All the species are bulbous and scapigerous. Leaves and scape arise simultaneously. *Bulbs* are globose, ovoid or ellipsoid; tunicated, outer scales scarious, inner fleshy; size varying from 10 to 45 mm in length and 10-40 mm across. *Leaves* are radical, with sheathing base, linear, subulate or falcate, parallel veined, glabrous, acute or acuminate at the apex. Breadth of the leaf has a characteristic range for each species but these ranges

tend to overlap. The breadth of the leaf varies from 2 to 5 mm in *D. serotinum*, *D. erythraeum*, *D. montanum*, *D. minor*, from 5 to 7 mm in *D. maharashtrensis*, *D. saxorum*, and from 4 to 15 mm in *D. ursulae* and *D. reidii*. *Scape* is narrow, as long as leaves or longer, stiff, naked and terete. *Inflorescence* is a raceme, loosely few flowered or densely many flowered. Frequency of flowers in a raceme varies from species to species. In *D. ursulae*, the raceme is 6-14 flowered in var. *ursulae* and 22-35 flowered in var. *longiracemosae*. *Flowers* are small and bracteate; bracts are lanceolate or deltoid and acuminate or clawed. Bracts are generally scarious, but coriaceous in *D. maharashtrensis*. Length of the bract is characteristic of the species but the range overlaps. It is 3-5 mm long in *D. concanense*, 5-10 mm in *D. saxorum* and *D. montanum* var. *madrasicum*, 7-9 mm in *D. erythraeum*, 8-12 mm in *D. serotinum* and 10-26 mm in *D. ursulae*. Length of pedicel does not appear to be of any taxonomic significance. It elongates with maturity and varies considerably within a species. It is 2-8 mm in *D. montanum* and 6-10 mm in *D. saxorum* and *D. reidii*. Pedicel is stout in *D. saxorum*, *D. ursulae* and *D. reidii* where as in other species it is linear. Comparative length of bract and pedicel is of taxonomic significance in some species. The pedicel is longer than bract in *D. concanense*, whereas the bract is longer than the pedicel in *D. erythraeum*, *D. maharashtrensis* and *D. ursulae*. This together with other characters are useful in determination of species. Perianth segments are 6 in number in 2 whorls of three each, the outer perianth campanulate; lobes lanceolate, hooded, acute, tubercled at the subapex; inner perianth tubular, lobes deltoid, hooded, tubercled at the subapex. Flower length is more or less same in all the species except *D. concanense* which

is much longer, 25-36 mm. Outer and inner perianth lobes are subequal in *D. reidii*, both are 2/3 free above, whereas in *D. minor* both are 1/2 free above. *Stamens* 6, uniseriate, at the throat of the perianth tube, included; filament adherent to the perianth tube, free portion short in some group of species whereas longer in others. Anther is dorsifixed, versatile, introrse and dehiscing longitudinally. *Pollen* oblong, foveolate. *Carpels* 3, syncarpous; ovary superior, sessile or stipitate, oblong or obovoid, trilocular, septal nectaries present in the ovary; style long, linear; stigma trifid. Ovary is commonly obovoid, but oblong in *D. montanum* var. *madrasicum* and *D. reidii*. Stipe of the ovary varies in a species, even in the same plant. In the collection of *D. serotinum* by Aitchson from Tons valley, W. Himalaya, stipe of the ovary varies from 0 to 3 mm. Length of the style is more or less same except in *D. concanense* where it is exceptionally long, 23 mm. *Capsule* subglobose to obovoid, trilocular, trilobed, loculicidally dehiscent, pericarp crustaceous, thin. Characteristics of the capsule is diagnostic in some species like *D. montanum* and *D. erythraeum*. *Seed* 3-9 in each chamber, superposed, brownish black, glossy, varies from orbicular to rotund even in the same locule, flat, wrinkled, obscurely winged.

Very little work has been done on Cytology of this genus. Mahabale & Chennaveeraiah (1954, 1960) have worked on the karyotypes. Chromosome numbers of *D. serotinum*, *D. montanum*, *D. saxorum* and *D. ursulae* are reported as $2n = 8$ or $64-68$, $2n = 20$, $2n = 10$ and $2n = 20$ respectively.

Indian species of this genus centre round Deccan peninsula from Maharashtra to Tamil Nadu and extend through Rajasthan to Kashmir, Himachal Pradesh and Uttar Pradesh in the North and Pakistan in the West and

through Madhya Pradesh to Orissa in the east. 9 species in India.

Type: *Dipcadi serotinum* (L.) Medik.

KEY TO THE SPECIES

1. Flower small (8-15 mm long); style short (3-6 mm long)
2. Perianth segments of the outer whorl are united to 1/3 and those of the inner one upto 2/3 of the length
3. Pedicel filiform; filament adherent wholly to the perianth protruding only at the tip
4. Fruit as long as broad
5. Scape long (20-70 cm), 10-16 flowered; capsule stipitate *serotinum*
- 5'. Scape shorter (15-20 cm), 4-12 flowered; capsule sessile *erythraeum*
- 4'. Fruit broader than long *montanum*
6. Ovary narrowly obovoid, stipitate var. *montanum*
- 6'. Ovary oblong, substipitate .. var. *madrasicum*
- 3'. Pedicel stout; filament protruding 2-5 mm above
7. Bract as long as pedicel *saxorum*
- 7'. Bract much longer than pedicel
8. Bract coriaceous, acute *maharashtrensis*
- 8'. Bract scarious, long acuminate *ursulae*
9. Matured raceme short, 6-14 flowered var. *ursulae*
- 9'. Matured raceme long, 22-25 flowered var. *longiracemosae*
- 2'. Perianth segments of both the whorls are subequal, united upto 1/3-1/2 of the length
10. Bracts smaller (4-5 mm); filaments shorter (1-2 mm) *minor*
- 10'. Bracts larger (6-10 mm); filaments longer (4-5 mm) *reidii*
- 1'. Flower long (25-36 mm long); style longer (23 mm long) *concanense*

Dipcadi serotinum (L.) Medik. in Act. Acad. Theod. Palat. 6:431. 1790; Baker in Journ. Linn. Soc.. 11:397. 1871; Hook. f. Fl. Brit. Ind. 6:347. 1892; Bamber, Pl. Punjab 441. 1916. (Fig. 1).

Hyacinthus serotinus L. Sp. Pl. 317. 1753 (Type: Spain, Savage Microfische No. 438.4). *Scilla serotinus* Sims. Bot. Mag. 21.t.859. 1805

(Type: England, hort. *Woodfords* s.n.—not seen; plate cited above agrees with the description). *Uropetalon serotinum* Ker-Gawl. in Bot. Reg. 2:156. 1816. *Uropetalum hydysuricum* Edgew. in Trans. Linn. Soc. 20:88. 1846 (Type: Ludhiana, 1844, *Edgeworth* 105 K). *Dipcadi hydysuricum* (Edgew.) Baker in Journ. Linn. Soc. 11:397. 1871; Hook. f. Fl. Brit. Ind. 6:347. 1892; Collett, Fl. Simlens. 526. 1902; Bamber, Pl. Punj. 441.1916.

Bulbs 20-35 × 15-30 mm, globose or ovate. *Leaves* few, 18-34 × 2.5 cm, linear, glabrous, acuminate at the apex, attenuated to the base. *Scape* 20-70 × 3.4 cm, rigid, glabrous. *Inflorescence* 10-12 cm long, erect, 10-16 flowered, compact in young stage, loose on maturity. *Flowers* small, 8-14 mm long, white or pale pink coloured; bracts 8-12 × 4.5 mm, as long as the pedicel or longer, sometimes slightly smaller, lanceolate or deltoid-lanceolate, acuminate, scarious; pedicel 5-10 mm long. *Perianth* persistent, segments subequal, outer ones united upto 1/3 from the base, campanulate, lobes slightly longer, lanceolate, acute, inner 3 united upto 2/3 from the base, tubular, spreading at the tip, obtuse; perianth segments hooded, tubercled at the sub-apex, 5 nerved along the mid zone. *Stamens* at the throat of the perianth tube; anthers 2-4 × .75 mm, linear-oblong, dorsifixed, introrse; pollen grain oblong, 100-130 μ × 60-80 μ, foveolate; filament adherent to the perianth tube, slightly free above. *Ovary* 3-5 × 2-3.5 mm, sessile or stipitate, oblong or obovate, trilobular; stipe when present may be more than 1 mm; style 3-4.5 mm long, linear; stigma trifold. *Fruit* capsule, stipitate, 8-10 × 8-10 mm, as long as broad, loculicidally dehiscent, subglobose to obovate; pericarp thin, brittle, with parallel markings. *Seeds* 6-8 in each locule, sometimes more, 4.5-5 × 3.5-4 mm, brownish black shining, rotund, compressed, wrinkled, hard, nar-

rowly winged.

Flowering time: February-June.

Fruiting time: March-September.

Ecology: Grows on the floor of the forest.

Distribution: Western Himalaya from Nepal to Kashmir upto an altitude of 2700 m, down to Saharanpur District of U.P.

Herbarium specimens examined:

INDIA: Kashmir: Mt. Tilla, 2700 m, 31-iii-1893, *Aitchison* 3 (CAL, DD, E). Himachal Pradesh: Tons valley, 900-1200 m, 13-v-1894, *Duthie* 14504 (CAL, DD); *ibid.* 5-v-1895. *Duthie* 15580 (CAL, DD); Simla, 2000 m, 19-vii-1910, *Rich.* 872 (K).

Uttar Pradesh: Dehra Dun, 21-v-1894, *Gamble* s.n. (flowered in Indian Botanic Garden, Calcutta, in April 1896) (CAL); *ibid.* (flowered in Indian Botanic Garden on 22-iii-1898) (CAL); Advicem Sodhi, 2200 m, 13-iv-1904, *Kabir* 14796 (K). Madhya Pradesh: Raipur, 21-ii-1907, *Haines* 2393 (K).

NEPAL: Karnali valley, 1200 m, 24-iv-1952, *Pollin, Sykes & Williams* 3964 (BM); Between Jungla and Gorgi, 2400 m, 8-viii-1952, *Pollin, Sykes & Williams* 5029 (BM); Simkot-Durpa, 3000 m, 17-vii-1968, *S. B. Malla* 14268 (BM); Suligad, 2700 m, 1-viii-1973, *S. Einarssa., L. Karby & B. Wetterhall* 2937 (BM).

PAKISTAN: Kagan valley, 2300 m, 31-v-1896, *Inayat* 20221 (CAL, DD); Jhadyor, 1700 m, May 1891, *Gamble* 22798 (CAL).

Note: *R. Wight* s.n. (E) collected from Peninsular India, differs in fruit. Capsules larger, straw coloured, 15-18 mm; seeds 5-6 × 4-4.5 mm, 14 seeds in each locule. Another gathering *R. Wight* s.n. (E) collected from Peninsular India has unusually small bracts and pedicels.

D. erythraeum Webb & Berth. Phyto. Canar. 3:341. 1848; Baker in Journ. Linn. Soc. 11:400. 1871; Cooke, Fl. Pres. Bomb.

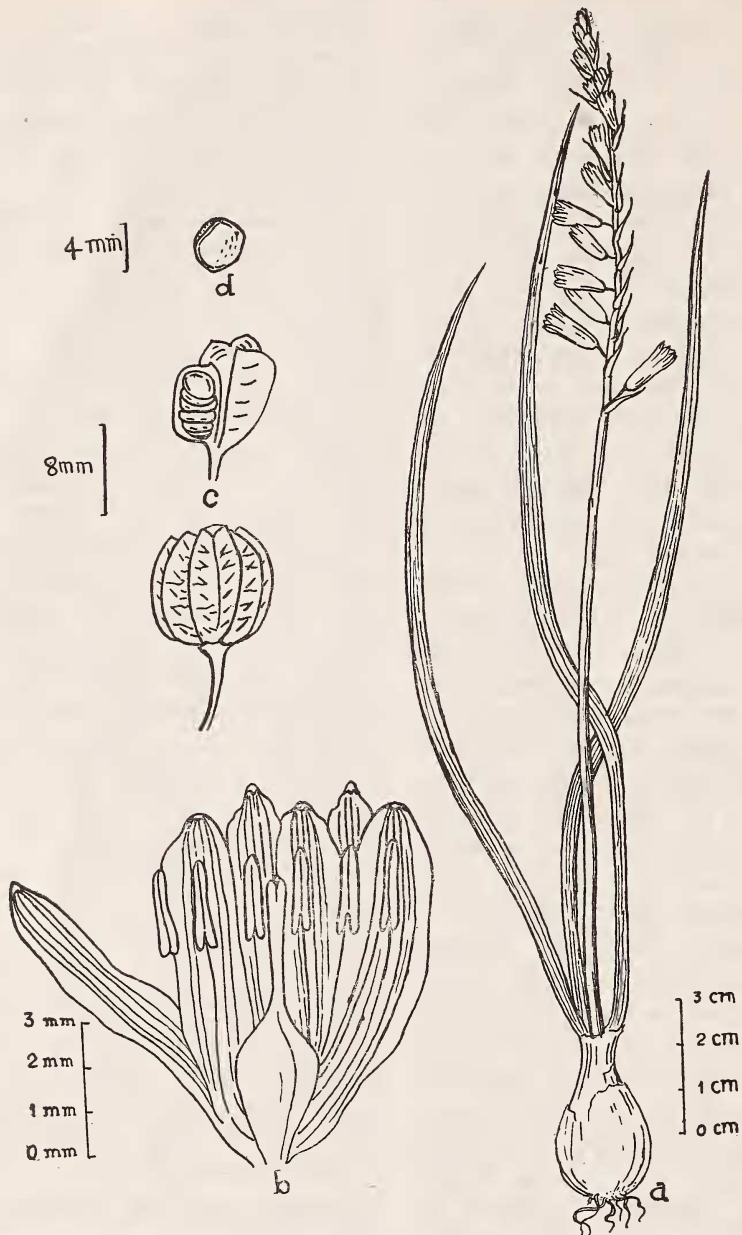


Fig. 1. *Dipcadi serotinum* (L.) Medik
(a) habit of the plant, (b) dissected flower showing all the parts, (c) fruit, (d) seed.

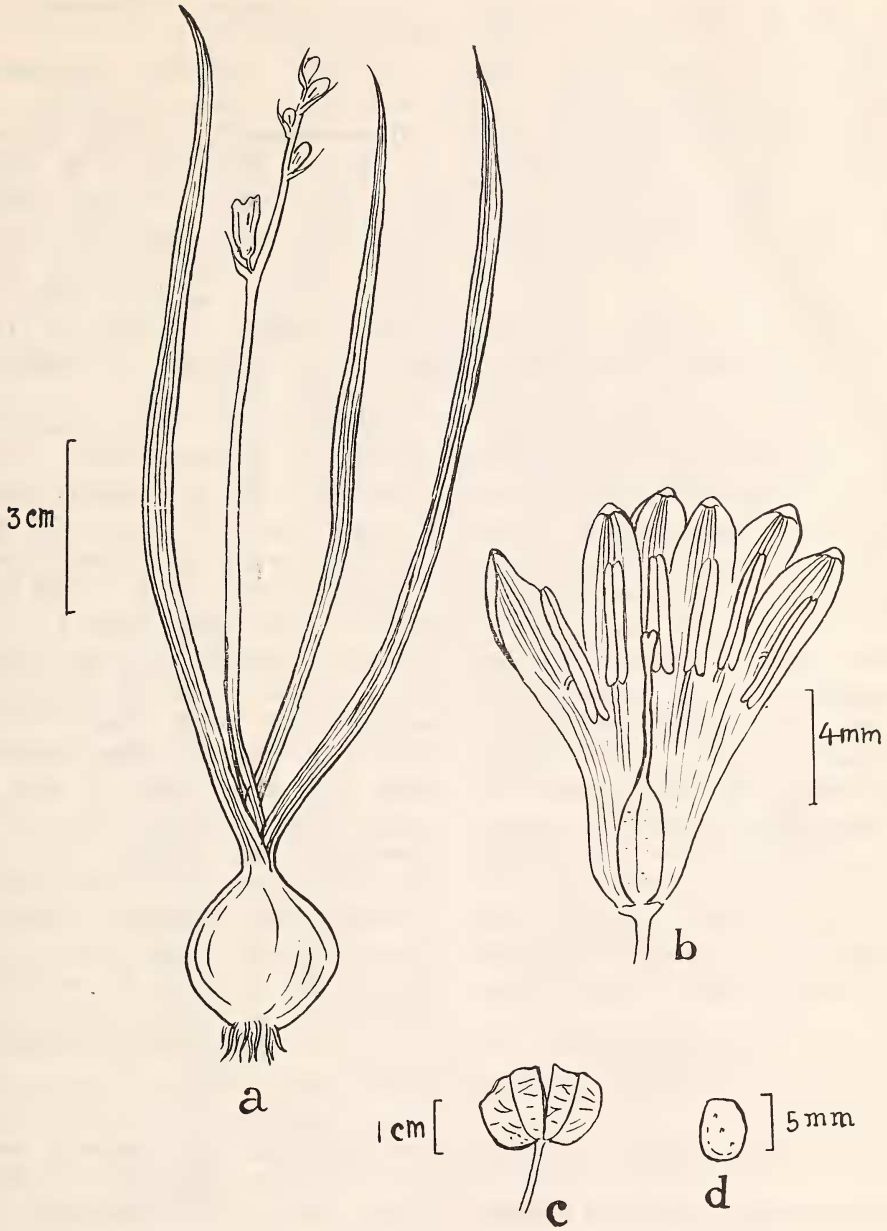


Fig. 2. *Dipcadi erythraeum* Webb & Berth.
(a) habit of the plant, (b) dissected flower, (c) fruit, (d) seed.

2:770. 1907; Blat. & Hallb. in Journ. Bomb. Nat. Hist. Soc. 26(4):972. 1920. *Uropetalum unicolor* Stocks in Journ. Bot. 4:180. 1852 (Type: Sind, lower hills, *J. C. Stocks* 634 lecto. K.; iso. CAL!). *U. erythraeum* Boiss Fl. Or. 5:286. 1882. *D. unicolor* (Stocks) Baker in Journ. Linn. Soc. 11:397. 1871; Hook. f. Fl. Brit. Ind. 6:346. 1892. (Fig. 2).

Bulbs 20-30 × 15-25 mm, ovoid. *Leaves* 5-6 cm close at the base of the scape, 15-20 × .2-.6 cm, broader below, sheathing at the base, glabrous, acute at the apex, falcate. *Scape* as long as leaves, 15-20 × .2-3 cm, terete, stiff, erect, naked. *Inflorescence* loose, 4-12 flowered. *Flowers* 12-14 mm long, small; pedicel small, 2-3 mm long; bracts longer than pedicels, 7-9 mm long, deltoid, membranous to scarious, acuminate. *Perianth* segments subequal, outer ones slightly longer than the inner, united upto 1/3 from the base; inner united upto 2/3 from the base, lobes lanceolate, 5 nerved, hooded, spreading at the tip. *Stamens* arising from the throat of the perianth segments, included; filaments adherent to the perianth tube, slightly free above; anthers large, 4-5 × .7-1 mm, linear, sagittate, dorsifixed, versatile, introrse. *Ovary* sessile, ± 4 × 2 mm, oblong; style narrow, ± 4 mm long. *Fruit* sessile, 12-14 mm as long as broad, quadrate, retuse above and below. *Seeds* rotund, 6-7 mm across, compressed, brownish black, shining, narrowly winged.

Flowering time: August-September.

Ecology: It grows on the hills of the arid region after rain.

Local names: "Junglee Bussur" in Sind and Baluchistan.

Use: Bulbs are eaten in Sind and Baluchistan.

Distribution: Rajasthan to Sind and Baluchistan.

Herbarium specimens examined:

INDIA: Rajasthan: Bairaswara, 28-8-1969, Wadhawa 5028 (BSA).

PAKISTAN: Karachi, September 1895, (CAL); Sind, *Stocks* 634 (CAL).

D. montanum (Dalz.) Baker in Journ. Linn. Soc. 11:398. 1871; Hook. f. Fl. Brit. Ind. 6: 346. 1892; Cooke, Fl. Pres. Bomb. 2:769. 1907; Bamber, Pl. Punj. 441. 1916; Mooney, Suppl. Bot. Bih. Or. 201.1950. *Uropetalum montanum* Dalz. in Journ. Bot. 2:142.1850 (Type: Bombay, Sahyadri Mt., Dalzell s.n. K.); Dalzell & Gibson, Fl. Bomb. 250.1861. var. *montanum*. (Fig. 3).

Bulbs 12-20 × 10-15 mm, ovoid. *Leaves* 3-8, shorter than the scape, 15-20 × .2 cm, linear, attenuated at the base, glabrous, acuminate at the apex. *Scape* 18-25 cm × 2-3 mm, erect, stiff. *Inflorescence* 5-15 cm long, loose raceme, 7-15 flowered. *Flowers* 11-13 mm long, small; pedicels 2-8 mm long; bracts 5-10 × 3-4 mm, as long as pedicels or longer, lanceolate or ovate, acuminate, clawed, scarious. *Perianth* segments outer longer, united upto 1/3 from the base, campanulate, lobes lanceolate, acute, inner ones united upto 2/3 from the base, tubular, tips spreading, obtuse, all hooded, tubercled at the subapex, mildly perfumed; nerves 5-6, colour white, or salmonpink or light brownish white, sometimes greenish inside. *Stamens* inserted at the throat of the tube; filament adherent along the perianth throughout the tube protruding at the tip; anthers 2-3 × .75 mm, linear-oblong, versatile, introrse; pollen oblong, 95-105 μ × 60-65 μ foveolate. *Ovary* stipitate, 3-5 × 1.5-2 mm, narrowly obovate-oblong, septal nectaries are present, stipe 1-2.5 mm; style 4-6 mm long, linear; stigma trifid. *Fruit* loculicidally dehiscent, much broader than long, narrowed at the base 5-10 × 10-15 mm, obovoid, deeply trilobed; pericarp thin, brittle, light brownish yellow, transversely striated. *Seeds* 3-5 in each locule,

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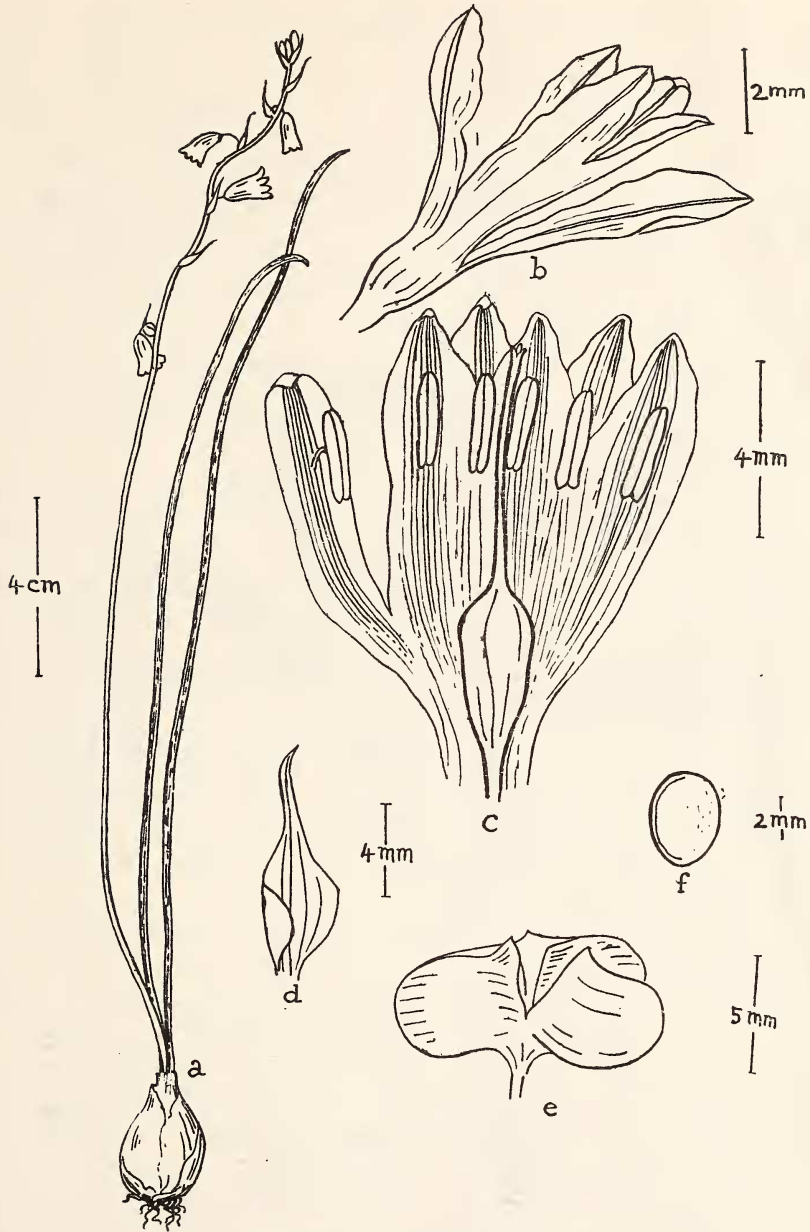


Fig. 3. *Dipcadi montanum* (Dalz.) Baker
(a) habit of the plant, (b) flower, (c) dissected flower showing all the parts,
(d) bract, (e) fruit, (f) seed.

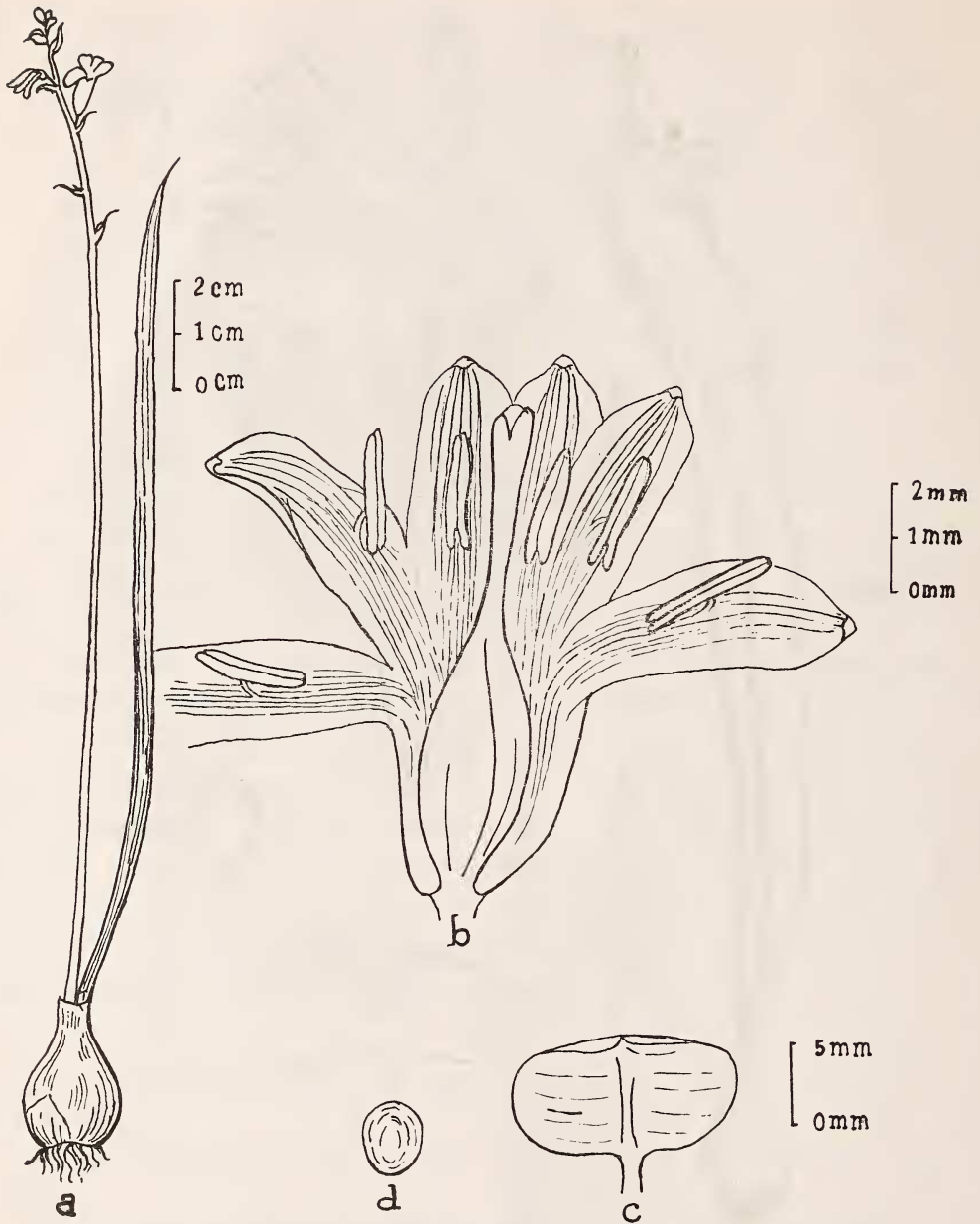


Fig. 4. *Dipcadi montanum* (Dalz.) Baker var. *madrasicum* (Barnes & Fischer)
Deb et Dasgupta comb. et stat. nov.
(a) habit of the plant, (b) dissected flower, (c) fruit, (d) seed.

3.5-5 × 2-3 mm, orbicular, angular or ellipsoid, compressed, wrinkled, narrowly winged, brownish black, glossy.

Flowering time: July-August.

Fruiting time: July-August.

Ecology: Common on the open grass land; gregarious, on shallow soil and laterite plateau at an altitude of 1130-2000 m.

Cytology: Chromosome number is reported as $2n = 20$ by Mahabale & Chennaveeraiah (1954, 1961).

Distribution: From Western coast of Decan upto Orissa in the east 1160 m to 1300 m and rarely in W. Himalayas at an altitude of 2000 m.

Herbarium specimens examined:

Maharashtra: Malabar Concan, *Stocks* s.n. (CAL, E); *Law* s.n. (CAL, E); *Gibson* s.n. (CAL); Junar, 6-vii-1894, *Talbot* (CAL); Belgaum, 12-vii-1893, *Talbot* 2277 (BSI); *ibid.*, 10-viii-1891, *Talbot* 3763 (BSI); Belgaum, 27-vii-1953, *Chennaveeraiah* 15755 (BLAT); *ibid.* July, *Ritchie* 1454 (E).

Madhya Pradesh: Bailadila, Bastar, 16-vii-1939, *Mooney* 1048 (K, CAL).

Orissa: Khandual Mali, 1100 m, south Kalahandi, 12-vii-1949, *Mooney* 3470 (K, DD).

Himachal Pradesh: Simla, Kaleemitia/Almora, 2000 m, 1859, *Maddens* 700 (E).

D. montanum (Dalz.) Baker var. *madrasicum* (Barnes & Fischer) Deb et Dasgupta comb. et stat. nov. Basionym: *D. madrasicum* Barnes et Fischer in Kew Bull. 1940: 301. 1941. (Type: Chingleput Dist., Tambaram, 70 m, Nov. 1937, *E. Barnes* 1801 lecto. K; *ibid.* Jan. 1939, *E. Barnes* 2085 para.K). (Fig. 4).

Bulbs 10-30 × 10-30 mm, ellipsoid or ovate. *Leaves* 2-3 on each bulb, 10-20 cm × 2-5 mm, linear, glabrous, acute. *Scape* 25-75 cm × 2mm, slender, glossy, erect, glabrous. *Inflorescence*

5-12 cm long, loose raceme, 5-12 flowered. *Flowers* 12-13 mm; pedicel very small, 2-4 mm, filiform; bracts as long as the pedicel or longer, 5-6 mm, deltoid, scarious, acuminate. *Perianth* segments outer ones united upto 1/3 from the base, campanulate, lobes obovate lanceolate, acute; inner ones united upto 2/3 from the base, tubular, tips spreading; all are slightly hooded, tubercled at subapex, 6 nerved. *Stamens* inserted; filaments arising from the base of the perianth, and adherent throughout the tube, slightly free above; anthers 2.5-3 × .75 mm, linear-oblong, dorsifixed, versatile, introrse. *Ovary* sessile or subsessile, 3.5-5 × 2.5 mm, ellipsoid or obovate-ellipsoid; stipe upto .5 mm long; style 3.5-4 mm, long, linear, stouter than that in var. *montanum*; stigma trifid. *Fruit* loculicidally dehiscent, about 7 × 12 mm, obovoid, narrowed at the base, deeply trilobed, straw coloured; pericarp thin. Seeds 4-5 in each locule, ovate-ellipsoid, 4-6 × 4 mm, obscurely winged, irregularly discoid, compressed, shining, brownish black.

Flowering time: May-September.

Fruiting time: July-November.

Ecology: Common in dry stream beds, sandy and marshy places, in scrub jungles and in crevices of rocks.

Local name: 'Katuvengaium' in Tamil. This name appears to be applied to other bulbous plants also.

Use: The bulb is eaten in times of scarcity.

Distribution: Distributed in Deccan, Tamil Nadu and also in Balaghat Plateau.

Herbarium specimens examined:

Madhya Pradesh: Balaghat plateau, May 1912, *Haines* 3586 (K).

Tamil Nadu: Kodumady, Tinnevely dist., 333 m, 9-vii-1959, *Sebastine* 8403 (MH); Coimbatore, 1700 m, 29-vii-1930, *Narayan-swamy* 3961 (MH); Guduvancheri, Chingle-

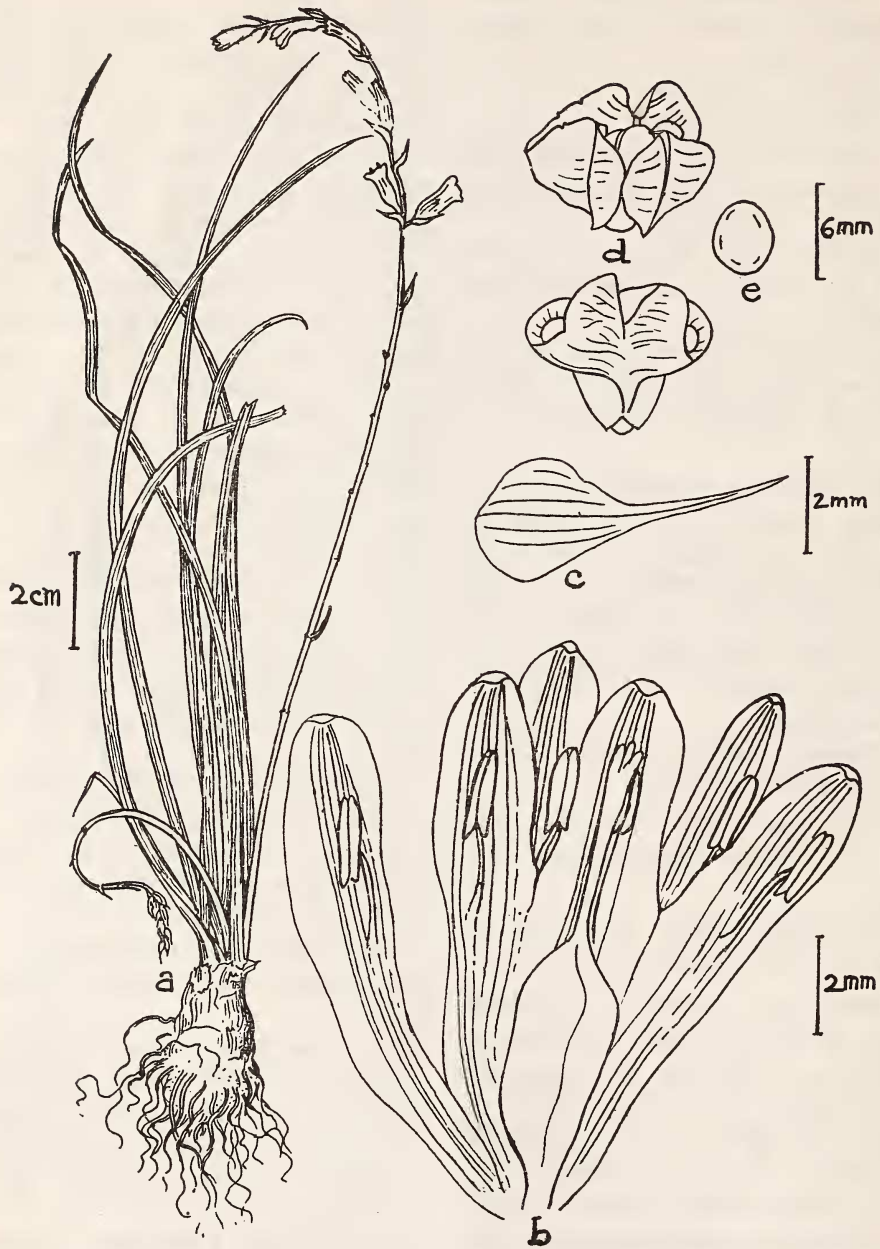


Fig. 5. *Dipcadi saxorum* Blatter
(a) habit of the plant, (b) dissected flower, (c) bract, (d) fruit, (e) seed.

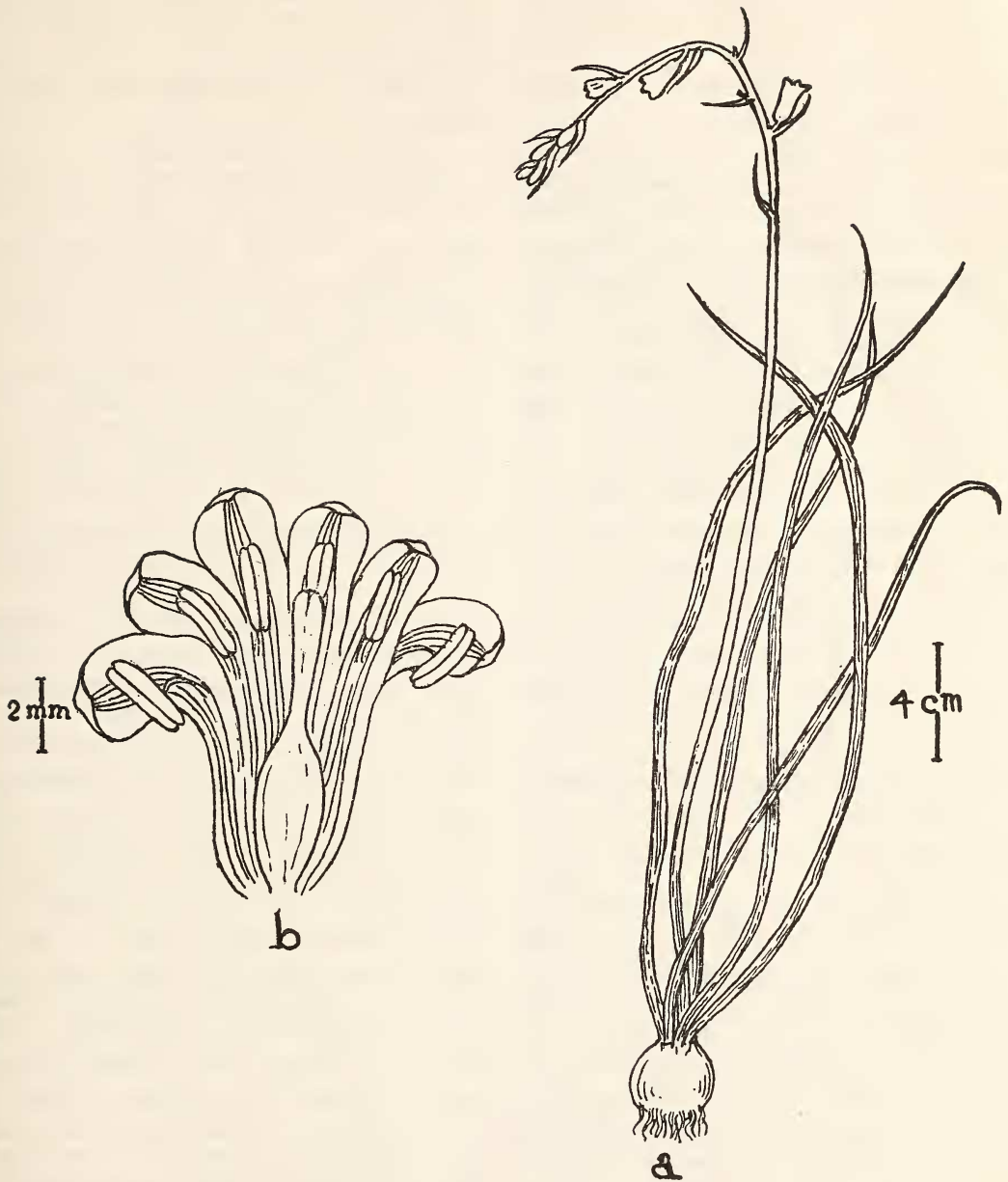


Fig. 6. *Dipcadi maharashtrensis* Deb et Dasgupta
(a) habit of the plant, (b) dissected flower.

put distt., September 1939, *Barnes* 2180 (K).

D. saxorum Blatter in Journ. Bomb. Nat. Hist. Soc. 32:736. 1928 (Type: Salsette, about 330 m, Aug. 1917, *Blatter & Hallberg* 1 BLAT—not seen). (Fig. 5).

Bulbs 15-20 × 15-20 mm, globose; adventitious roots, closely arising from the base. *Leaves* 16-25 cm × 5-7 mm, linear, acuminate, glabrous. *Scape* longer than leaves, 20-40 cm × 2-3 mm, glabrous. *Inflorescence* loose raceme, 15-20 flowered. *Flowers* about 10 mm long; pedicel stout, 6-10 mm long, bracts 5-7 ± 3 mm, ovate, acuminate, scarious, shorter than pedicel. *Perianth* segments outer united upto 1/3 from the base, campanulate, slightly longer than inner; inner united upto 2/3 from the base, tubular; all the perianth lobes hooded at tips, tubercled at the subapex, veins 5-6, parallel, convergent along midzone; white with green stripes along the middle of the perianth segments, sometimes buff coloured, turning to orange. *Stamens* at the throat of the perianth tube, included; filaments arising from the base of the perianth, adherent throughout, protruding above; free portion 3-4 mm long, filiform, broader at the base, acute at the apex; anthers 2 × .75 mm, oblong, dorsifixed, versatile, introrse; pollen oblong, 105-120 μ × 70-80 μ, foveolate. *Ovary* 3.5-4 × ± 2 mm, oblong-obovoid, trigonous, conspicuous septal nectaries present, stipitate, stalk ± 1 mm; style ± 4 mm long, stout; stigma slightly thicker than style, trifid. *Fruit* 8-10 × 10-13 mm, loculicidally dehiscent, pericarp thin, brittle, crustaceous, light brownish yellow in colour. *Seeds* many, 4-9 in each chamber, superposed, 4-5 × 3 mm, orbicular, ellipsoid or quadrangular, compressed, wrinkled, hard, wingless, brownish black, dull.

Flowering time: June-October.

Fruiting time: July-November.

Ecology: Very common on rocky hills.

Cytology: Chromosomes are reported as 2n = 12 by Mahabale & Chennaveeraiah (1954), Chennaveeraiah & Mahabale (1962).

Distribution: Western Deccan, abundant in Borivli.

Herbarium specimens examined:

Maharashtra: Borivli, Salsette, 8-viii-43, *Blatter* 2353-2361 (BLAT); *ibid.*, 25-vii-1953, *Santapau* 15714A-D (BLAT); *ibid.*, 26-vii-1959, *Santapau* 23159 (BLAT); *ibid.*, 25-x-1956; *Rukmini Bai* 79 (BLAT); *ibid.*, 27-vi-55, *Rukmini Bai* 303, (BLAT); *ibid.*, 26-vii-59, *Merchant* 1194, (BLAT); *ibid.*, 24-viii-1957, *Merchant* 173 (BLAT); bulbs brought from Kanheri caves, Salsette and planted in St. Xavier's College Garden, 25-ix-56, *Rukmini Bai* B.R. 473 (BLAT); Borivli, 11-viii-52, *Fernandez* R. 87 (BLAT); *ibid.*, 25-vii-53, 1351 (BLAT); *ibid.*, 9-viii-53, 1398 (BLAT).

Dipcadi maharashtrensis Deb et Dasgupta in Journ. Bomb. nat. Hist. Soc. 72(3):822. 1975. (Type: Panchgani, 5-ix-1955, *Rukmini Bai* BR 933 (BLAT). (Fig. 6).

Herbs bulbous, scapigerous. *Bulbs* globose, small, about 2.5 cm × 2.5 cm, tunicate, rooting profusely from the base. *Leaves* radical, about 6, shorter than the scape, 25-30 cm × .5-7 cm, linear, broadest at the middle, plicate, entire, acute, coriaceous glabrous; veins, 8-14 in number. *Scape* about 36 cm long, about .4 cm across at the base, narrowing upwards to .1 cm across at the apex, slender, terete, glabrous, naked. *Inflorescence* raceme, about 13 cm long, loose, bearing about 12 flowers. *Flower* 11-13 mm long; pedicels stout, 2-3 mm long; bracts persistent, much longer than the pedicels, 10-20 × 3-3.5 mm, entire, subulate, coriaceous. *Perianth* outer ones longer, united upto 1/3 from the base, campanulate; inner ones united upto 2/3 from the base, tubular; lobes 2-2.5 mm broad; obovate-lance-

olate, obtuse, tubercled at the sub-apex, nerves 5, convergent towards the apex. *Stamens* included, filaments adherent to the inner perianth tube, remaining free for about 1-2 mm above, filiform; anthers 2 celled, oblong, 2.5-2.7 × .6-.7 mm, dorsifixed, introrse, dehiscent longitudinally. *Ovary* stipitate, broadly oblong, 3.5-4 × 2.5-3 mm, with numerous ovules in axile placentation; style stout, 4-5 mm long about .7 mm across.

Distribution: Localised in Maharashtra State.

Herbarium specimens examined:

Maharashtra: Panchgani, 5-ix-1955, *B. Rukmini Bai* BR 933, cultivated in St. Xavier's College, Bombay, where it flowered in September (BLAT).

D. ursulae Blatter in Journ. Bomb. Nat. Hist. Soc. 32:735. 1928 (Type: Maharashtra State, Panchgani, 1500 m August, 1925, *Blatter* P 74 BLAT!) var. *ursulae*. (Fig. 7).

Bulb 10-20 mm across, globose or ovoid, small with many fibrous roots from the base.

Leaves 4-6, longer than the scape, 15-30 cm long, 4-7 mm broad, linear, coriaceous, plicate, sheathing at the base, grass green. *Scape* 1 or 2 per bulb, 15-20 cm × 2-6 mm, terete, glabrous, naked. *Inflorescence* raceme, 6-14 flowered, close in bud, ultimately becoming loose, and elongating to 12 cm long. *Flowers* 9-12 mm long, 18 mm across, small; pedicel 5-7 mm long, stout; bracts much longer than the pedicel, 10-26 mm long, ovate, long acuminate, scarious, 2-4 mm beyond the bud. *Perianth* segments, mildly fragrant, white to pale cream or orange red, sometimes green outside or lower surface of the perianth pink brown or greenish along the midnerve and whitish margin, outer lobes 6-7 mm long, recurved at the middle and bent downwards, tube smaller, 3-4 mm long, inner perianth lobes shorter than the outer, connate to about

the middle, tubes 5 mm long, lobes 3-4 mm as long as broad, recurved at right angle to the tube, apex hooded, subapex tubercled, veins 5, closely parallel along the middle, convergent at the tip; filaments adherent to the perianth tube, included; free part 2-3 mm long, broader at the base, tapering at the apex; anthers at the mouth of the tube, 2 × .5-.75 mm, oblong or linear-oblong, dorsifixed, introrse, dehiscent longitudinally; pollen oblong, 85-105 μ × 60-80 μ, foveolate. *Ovary* stipitate, 4-5 × 1.5-2.5 mm, narrowly obovoid-oblong, trigonous, stipe nearly 1 mm long, conspicuous septal nectaries are present, style 5-6 mm long, stout or filiform linear, slightly thickened at both ends, papillose, especially in the upper half; stigma trifold, thicker than the style or not. *Capsule* loculicidally dehiscent, as long as broad, young capsule longer than broad; bracts persistent to fruits. *Seeds* ± 6 × 5 mm, semiorbicular, compressed, glossy, black.

Flowering time: June-August.

Fruiting time: June-August.

Ecology: Abundant on gravelly, grassy hill top.

Cytology: Chromosome number is reported as 2n = 20 by Mahabale & Chennaveeraiah (1954) and Chennaveeraiah & Mahabale (1962).

Distribution: Found only in Maharashtra State.

Herbarium sheets examined:

Maharashtra State: Trombay hills, 26-vii-1958, *Merchant* 606 & 607 (BLAT); *ibid.*, 1-viii-1959, *Merchant* 1197, 1198 (BLAT); *ibid.*, 26-vii-58, *Shah* 9692 (BLAT); *ibid.*, 10-viii-1957, *Merchant* 90 (BLAT); *ibid.*, 26-vii-58, *Balamani B.* 88 (BLAT); *ibid.*, 26-vii-58, *Shah* 9894 (BLAT); Panchgani tableland, 1-viii-1953, *Chennaveeraiah* 15756 (BLAT); top of Shivneri hills (south west), 25-vii-63, *Ansari* 88729 (BSI); Mangni hill near Khamgaon, 6

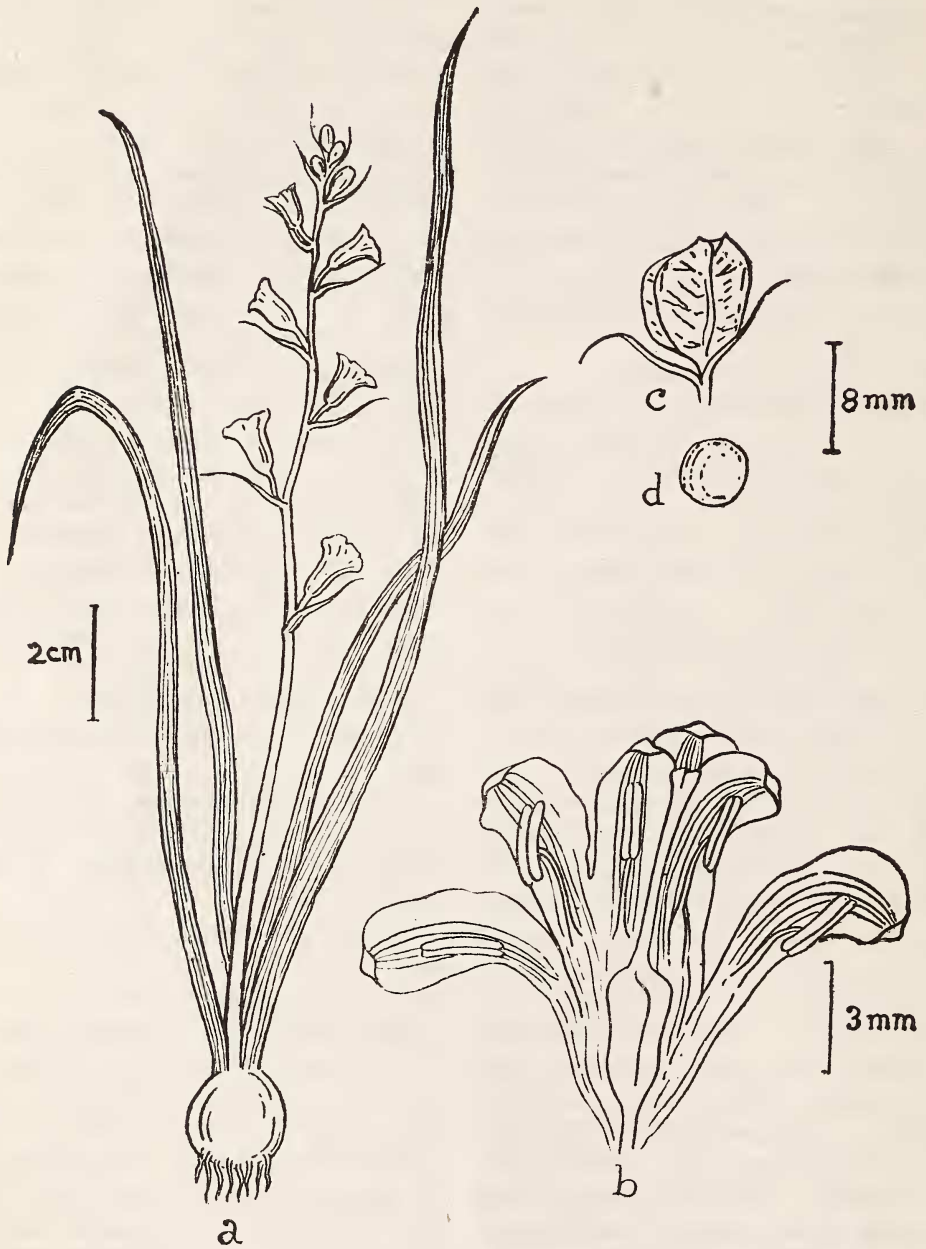


Fig. 7. *Dipcadi ursulae* Blatter
(a) habit of the plant, (b) dissected flower, (c) fruit, (d) seed.

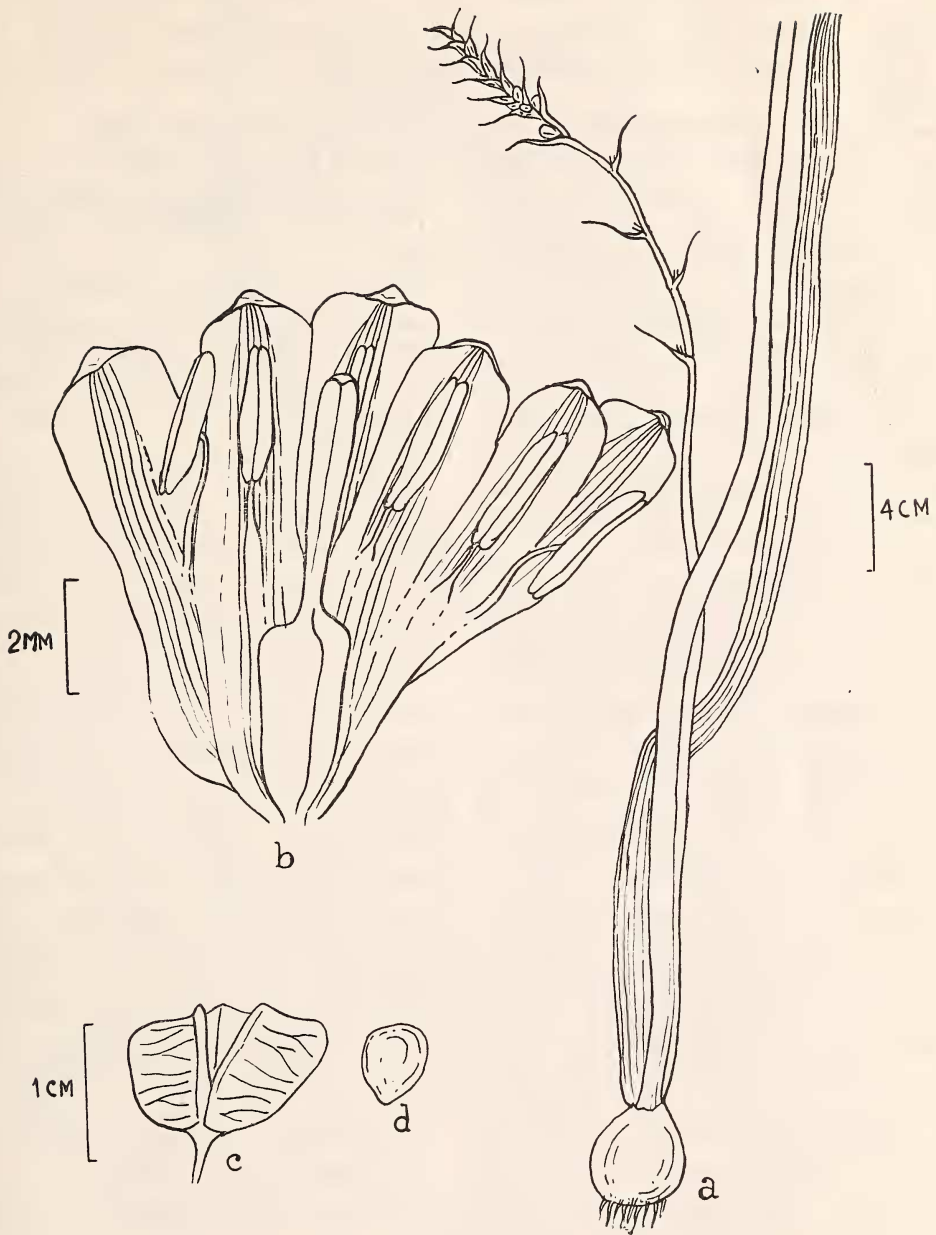


Fig. 8. *Dipcadi ursulae* Blatter var. *longiracemosae* Deb et Dasgupta
(a) habit of the plant, (b) dissected flower, (c) fruit, (d) seed.

miles N.W. of Junnar, 29-vi-64, *Hemadri* 99527 (BSI); Shivneri hills, (flowered and fruited in BSI garden), 25-vi-65, *Hemadri* 107099 (BSI).

D. ursulae Blatt. var. *longiracemosae* Deb et Dasgupta in Journ. Bomb. Nat. Hist. Soc. 72(3):823. 1975 (Type: Girner hill, Junagadh 25-viii-58, P. V. Bole 743 BLAT—Holotype and ibid. 29-viii-52, P. V. Bole 851 BLAT—Paratype). (Fig. 8).

Herbs 2/3-1 m tall, scapigerous, bulbous; bulbs ovoid, small, 3-4.5 × 3-4 cm, white, rooting from the base. *Leaves* 1-6, radical, 30-66 × .5-1.5 cm, linear, glabrous, entire, acute, veins 12-20. *Scape* one or two, arising from the bulb, 30-75 cm long, .4-1.2 cm across, terete, smooth, naked, light brownish yellow in colour. *Inflorescence* raceme, 10-30 cm long, dense in early stage, loose when matured, 22-35 flowered. *Flower* white; bracts persistent, 10-13 × 3-4 mm, deltoid, long acuminate, scarious, plicate, entire, much longer than the pedicel; pedicels 5-7 mm long. *Perianth* 9-11 mm long, corolline, outer ones longer, united upto 1/3 from the base, campanulate, lobes obovate-lanceolate, recurved at the middle, obtuse, tubercled at the subapex; inner ones shorter, united upto 2/3 from the base, tubular, lobes obovate-lanceolate, obtuse, recurved at the tip, all are hooded, nerves 5-7, prominent, convergent towards the apex. *Stamens* included; filaments adnate to the inner perianth tube, protruding 2-3 mm above, free portion filiform, anthers 2 celled, linear oblong, 3-3.5 mm × about .7 mm, dorsifixed, introrse, dehiscing longitudinally. *Ovary* sessile, narrowly obovate-oblong, trisulcate, 4.5-4.7 mm × about 1 mm, with numerous ovules in exile placentas; style 4.5-4.7 mm long, stout, broadening above; stigma trifid. *Fruit* 7-10 × 9-10 mm, loculicidally dehiscent, light yellowish brown in colour, as long as broad. *Seeds*

3.5-4 × 3.5 mm, semi-rotund, obovate or ellipsoid, compressed, glossy, brownish black in colour, narrowly winged, wrinkled, many in each loculus.

Flowering time: July-August.

Fruiting time: July-August.

Ecology: On wet rocky slopes of hills.

Distribution: Maharashtra and Gujarat States.

Herbarium specimens examined:

Maharashtra: Girnar hill, Junagadh, 25-viii-1958, P. V. Bole 743 (BLAT); ibid., 29-viii-52, P. V. Bole 851 (BLAT); Maharashtra; Shivneri (North East), 27-vii-1963, Ansari 88785 (BSI).

D. minor Hook. f. Fl. Brit. Ind. 6:346. 1892 (Type: Concon, Hewraplain, Aug. 1859, Dalzell s.n. K a fragment only; no bulb, leaf and fruit, only 5 scapes, two of which bear flowers others without any; flowers small). Cooke, Fl. Pres. Bomb. 2:770. 1907.

Bulbs 18-20 × 15-20 mm, ovoid, with fibrous roots at the base. *Leaves* 12-15 cm × 2-3 mm, linear, plicate, glabrous. *Inflorescence* loose raceme, 6-12 flowered. *Flowers* 8-9 mm; bracts 4.5 × 3-4 mm, deltoid, acuminate, scarious; pedicel 3-5 mm, small, filiform. *Perianth segments*, outer narrower than the inner, all are united 1/3-1/2 from the base, 7-9 veined. *Stamens* at the throat of the perianth tube; anther 2.5-3 × .7 mm oblong, dorsifixed, introrse; filament adherent to the tube, free portion 1-2 mm, filiform. *Ovary* 3-3.5 × 1.5-2 mm narrowly obovoid, sessile; style 3-5 × .5 mm long, linear; stigma trifid.

Distribution: In Deccan, rare.

Herbarium sheets examined:

Peninsular India Orientalis, R. Wight s.n. (E).

Note: This is allied to *Dipcadi erythraeum* Webb & Berth. and *D. serotinum* (L.) Medik., differing from the former in having shorter

REVISION OF THE GENUS DIPCADI

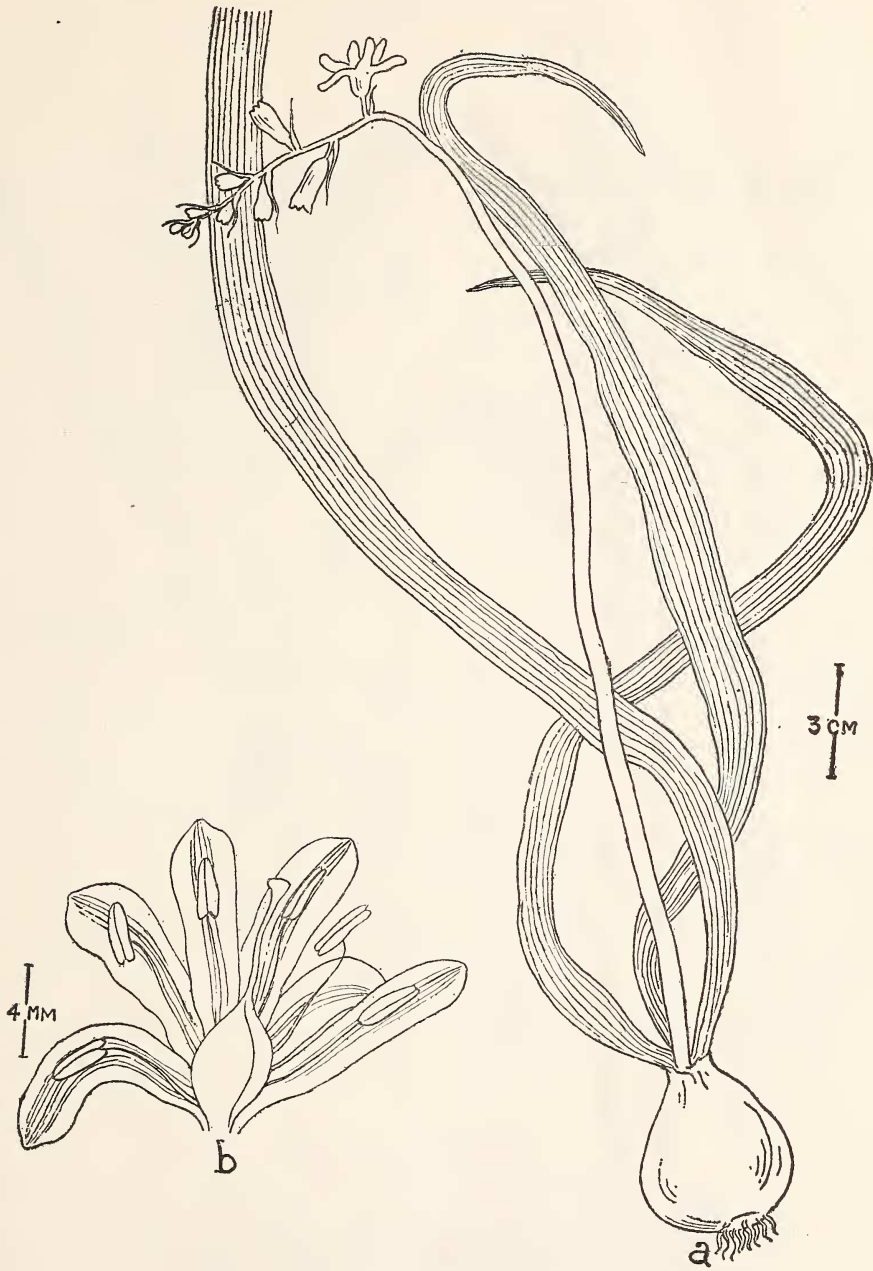


Fig. 9. *Dipcadi reidii* Deb et Dasgupta sp. nov.
(a) habit of the plant, (b) dissected flower.

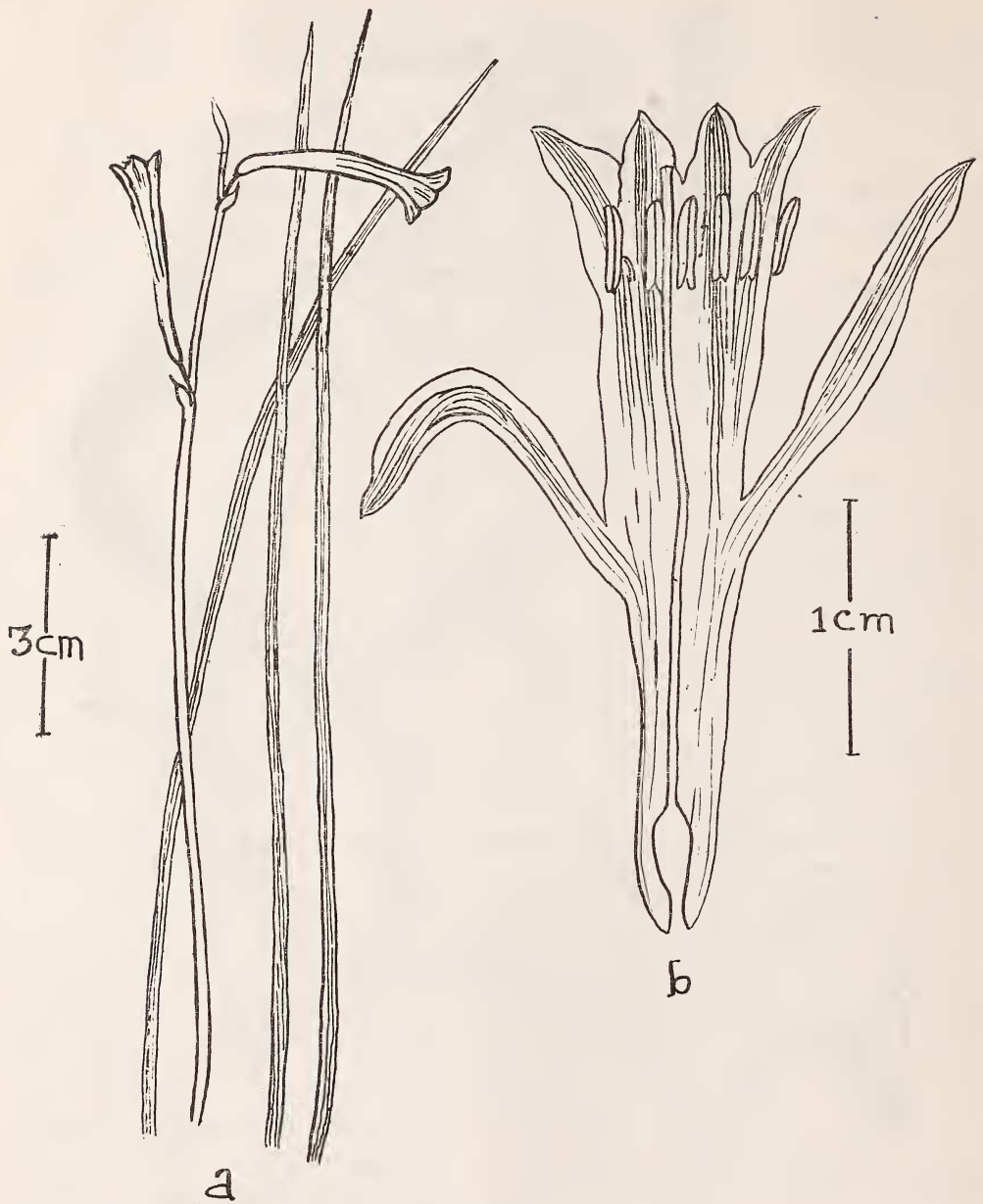


Fig. 10. *Dipcadi concanense* (Dalz.) Baker
(a) habit of the plant, (b) dissected flower.

bracts and many flowered (6-12) inflorescence, and from the latter in shorter size of the plant, perianth segments 7-9 nerved and united $1/3-1/2$ from the base.

D. reidii Deb et Dasgupta sp. nov. Species haecab *D. serotino* differt foliis latoribus, bracteis latoribus *P. erianthiis* interioribus c. $1/3$ longitudine adhaerentibus filamentorum segmentis liberatis multum longioribus. (Type: Malphagarh, Byauswells, about Kali valley, 2300 m, 16-vii-1886, *J. R. Reid* s.n. A—holotype, B—isotype E!). (Fig. 9).

Herbs bulbous, scapigerous, with waxy lusture; bulbs ovoid, about 4×3.5 cm shining white in colour; disk rounded, rooting below. *Leaves* 3-4 in number, as long as scape or longer, $30-40 \times 1-1.2$ cm, broadly linear, broadest above the middle, acute, entire glabrous, thin in texture, light brown in colour when dry; veins adpressed on the lower surface. *Scape* $30-40 \text{ cm} \times .3-.4 \text{ cm}$, terete, glabrous. *Inflorescence* raceme 4-20 cm long, bearing 10-18 flowers, compact at the early stage, loose on maturity. *Flower* campanulate, 13-15 mm long, light brown in colour when dry; pedicel 6-10 mm long, linear; bracts persistent, as long as pedicels, $6-10 \times 5-6$ mm, ovate, lanceolate, scarious. *Perianth* united upto $1/3$ from the base forming tube, remaining free above; lobes narrowly oblong, thickened along the veins frilled; veins 5-7, subparallel. *Stamens* included; filaments adnate to the perianth tube, protruding 4-5 mm above, filiform, broader at the base, attenuated to the apex; anthers narrowly oblong, about $2.5 \times .7$ mm, 2 celled, introrse, dorsifixed. *Ovary* sessile, about 5×3 mm, trisulcate, oblong, glabrous, with many ovules in axile placentas; style 5.5-6 mm long, linear; stigma obscurely trifid.

Distribution: W. Himalayas.

Herbarium sheets examined:

Malphagarh, Byuswells, Kali valley 2300 m,

16-vii-1886, *Reid* s.n. (E).

D. concanense (Dalz.) Baker in Journ. Linn. Soc. 11:399. 1871; Hook. f. Fl. Brit. India 6:346. 1892; Cooke, Fl. Pres. Bomb. 2:769. 1907. *Uropetalum concanense* Dalz. in Journ. Bot. 2:143. 1850 (Type: Bombay, Dalzell. s.n. K!); Dalzell & Gibson, Bomb. Fl. 250. 1861. (Fig. 10).

Herbs scapigerous, bulbous. *Leaves* 3-4 on the bulb, 5-22 cm $\times \pm 2$ mm, linear, acute, broader at the base, *Scape* 18-28 cm long, narrow, erect, terete, glabrous. *Inflorescence* loose raceme, 2-6 flowered. *Flowers* long, 25-36 mm, salvar-shaped; tube narrow, 8-12 mm long and 2-4 mm across; pedicel 5-10 mm long, filiform; bracts 3-5 mm long, deltoid, scarious, acuminate, as long as the pedicel or shorter. *Perianth* segments 6 nerved, shining white in colour, outer lobes $\pm 15 \times 3$ mm, lanceolate, acute, fimbriate, spreading, inner ones $3-4 \times 3$ mm. *Stamens* at the throat of the tube; filament adherent to the tube, free portion 2 mm long, filiform; anthers narrowly oblong, $3 \times .75$ mm dorsifixed, introrse. *Ovary* stipitate, $\pm 2.5 \times 1.5$ mm, obovoid oblong; stipe ± 1.5 mm; style ± 23 mm long, narrow, papillose; stigma, trifid. *Capsule* stipitate; lobes rounded. *Seeds* 6 in each locules, compressed, shining black, rotund.

Distribution: Malabar-Konkan coast.

Herbarium specimens examined:

Malabar-Concan, *J. C. Stocks* s.n. (K, E, CAL); *Law* s.n. (K, E, CAL).

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